REPORT OF THE WASTE REDUCTION AND PREVENTION COMMITTEE ON USED TIRES

Submitted to:

The Honourable J. Glen Cummings
Minister of Environment, Province of Manitoba

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Priority Material — Used Tires

W R P

Waste Reduction and Prevention

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The views expressed in this report are those of the Committee representatives. The publication of this report by Manitoba Environment does not constitute acceptance or endorsement of any or all of the recommendations it contains. As part of the WRAP process, Manitoba Environment has facilitated the development of this report so that further consultation can proceed to develop a WRAP Action Plan for approval by the Minister of Environment.

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EXECUTIVE SUMMARY

The Waste Reduction and Prevention (WRAP) Committee on Used Tires was formed in early 1991, to advise the Minister of Environment on the best method to establish a comprehensive waste rubber storage, collection and reuse system in Manitoba to achieve a high rate of recovery of waste tires and other waste rubber products. The Committee included representatives of tire manufacturers and importers, independent tire dealers and major retailers, and auto recyclers, with assistance from the WRAP Branch.

Currently, most used tires are generated in southern Manitoba, near the major population centres. Most used tires are landfilled, with only small quantities being retreaded or recycled into other products. Very few tires are stockpiled, and although there are a number of stockpiles in existence, they are relatively small.

The Committee reviewed a number of technical alternatives, using the "4 R's" of Reduce, Reuse, Recycle and Recover as a framework. Reduction has already taken place to a great extent, with the introduction and refinement of the longer-lasting steel belted radial tire. Over the past 30 years, the life of tires has approximately tripled. Further significant reductions in volume are unlikely from the technological development point of view; however, improved maintenance by vehicle owners, including correct pressure and alignment, could add as much as 30% to tire life.

Retreading represents the best example of reuse, and is common in many sectors of the tire industry. Relatively few passenger tires are retreaded, in part because most casings are rejected as non-retreadable due to poor inflation and tire maintenance. Other reuse applications, including the sale of used tires, and the construction of reefs and crash barriers, are relatively low in volume.

Due to the chemical changes that take place in the rubber compounds during the construction of a tire, there is no technology known which would permit safe new tires to be made from used ones. Therefore, recycling must be viewed in the context of other product applications. However, since tires and other engineered rubber products account for some 85% of rubber use, the opportunity for recycling into other value-added products is limited.

One major alternative is the use of rubber asphalt paving mixes. A number of systems have been developed, and are being tested and evaluated in a number of places in North America.

Finally, recovery of the energy from tires offers a significant opportunity to utilize the waste product and extend our energy resources. This is the most common use for scrap tires in many other jurisdictions. Inland Cement, in Manitoba, has expressed some interest in investigating alternative fuel sources.

The Committee concluded that both short and long term strategies need to be put in place to address the scrap tire issue and outlined a number of steps which will enable the Minister of Environment to implement a comprehensive strategy. In the short term, use of Tire Derived Fuel, monitoring and, perhaps, implementation of use of rubberized asphalt appear to offer the only alternatives capable of accommodating significant volumes of scrap tires. While preferable from an environmental point of view, the Committee concluded that the commercial development of value added products utilizing rubber from used tires was a long term strategy.

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THE WRAP PROCESS

In June 1989, the Minister of Environment set out a challenge for Manitobans to accomplish a 50 percent reduction in the volume of solid waste that goes to waste disposal grounds by the year 2000. The Minister also appointed a multi-stakeholder Recycling Action Committee (RAC) to develop recommendations on a strategy for accomplishing this objective. In June 1990, the RAC Action Plan, which included 56 recommendations, was publicly released. This report placed a particular emphasis on strengthening responsibility within the "distribution chain" to ensure that waste would be reduced for designated products and materials, and that markets would be established for secondary materials where this was necessary.

In April 1990, the Manitoba Legislature adopted new legislation, the *Waste Reduction and Prevention Act,* to establish an effective process and necessary powers for accomplishing waste reduction objectives. Following a review of RAC's recommendations to ensure that the new legislation was consistent with the proposed strategy, the Manitoba Government proclaimed *the WRAP Act* in August 1990.

The WRAP Act establishes a process, with clearly defined stages, for addressing waste reduction problems. These stages are as follows:

- Identification of a priority material.
- The Minister of Environment appoints a stakeholder WRAP Committee for each priority material.
- Adoption of a target for waste reduction or prevention.
- Development of plans and programs to meet the target.
- Minister approves WRAP Action Plan.
- Recording of information on the program's performance.
- Assessment of effectiveness.

The procedure followed by Manitoba Environment for the development of WRAP Action Plans ensures public consultation and accountability. Stakeholders and the public may review both the WRAP Committee terms of reference and its reports. There will be full consultation on regulatory initiatives.

The Waste Reduction and Prevention Act specifically empowers the Minister of Environment to develop regulations calling on "producers or groups of producers to develop, submit and implement waste reduction and prevention plans". Consistent with the desire to develop cooperative and non-regulatory solutions prior to any formal adoption of appropriate regulations, the Minister of Environment, under the authority of the Waste Reduction and Prevention Act, established four committees in January 1991 to provide advice on processes for "distributors of products or materials with the potential to become waste" to report on how they will fulfill their responsibilities to minimize waste and exercise stewardship.

This report of the WRAP Committee on Used Tires reports on the industry stakeholders' perspective on what would constitute an appropriate waste reduction target, and how this target can be achieved. It responds to the Terms of Reference that were developed for the Committee by the Minister.

Recognizing the critical role of other stakeholders in the process of determining and achieving waste reduction targets, the Committee has been explicitly requested to identify appropriate roles for these stakeholders. Input from other stakeholders has also been explicitly requested by the Minister. The Reports are to be distributed to other stakeholders for comment. The Minister will respond to the WRAP Committee Report and accompanying consultations to provide direction on the adoption and implementation of WRAP Action Plans.

INTRODUCTION

In June 1989, Manitoba established a 50% waste reduction target by the year 2000. A Recycling Action Committee was also formed with the mandate to develop a strategy for reducing waste and promoting recycling. The resulting report "Action Plan--A Waste Minimization Strategy for Manitoba in the 1990's" issued in May 1990, contained a recommendation that automotive tires be examined to set a negotiated waste reduction target to achieve a high level of waste reduction before June 1, 1993.

With the proclamation of the Waste Reduction and Prevention Act (WRAP) in August 1990, a clear process for setting and meeting reduction targets and for addressing waste reduction problems was established.

PURPOSE

The WRAP Committee on Used Tires was formed to advise the Minister of Environment on the best method to establish a comprehensive waste rubber storage, collection and reuse system in Manitoba to achieve a high rate of recovery of waste tires and other waste rubber products.

The Committee was provided the following background information:

WHEREAS there is an estimated one million waste tires generated annually in Manitoba;

WHEREAS approximately 75% of these tires are now being landfilled in Manitoba creating handling problems and a loss of a valuable resource;

WHEREAS another 10% of these tires are being stockpiled, creating a potential fire hazard;

WHEREAS the Government of Manitoba is committed to establishing a comprehensive collection and management system for all used tires generated in Manitoba;

WHEREAS *the Waste Reduction and Prevention Act* empowers the Minister of Environment to develop regulations calling on "producers or groups of producers to develop, submit and implement waste reduction and prevention plans" for materials they distribute in the Province of Manitoba;

THEREFORE, the Minister of Environment, under the authority of *the Waste Reduction and Prevention Act,* hereby establishes a committee to establish a safe and efficient collection and management system for used tires in Manitoba and provide a process for "distributors of products and materials with the potential to become waste" to report on how they will fulfill their responsibilities to minimize waste and exercise stewardship for their products.

TERMS OF REFERENCE

The Committee operated under the following "Terms of Reference":

- Review and comment on existing inventories of used tires and other rubber goods existing in the Province of Manitoba.
- Develop achievable targets for collection of used tires throughout the Province and transportation to a central staging area for processing or shipment to out-of-province recycling facilities.
- Develop methods to ensure accountability and compliance.
- Determine an appropriate financing system which ensures that the costs of collection, disposal, and of ensuring compliance are absorbed by the waste generating community in a manner which does not distort the market.
- Develop a strategy and a report on an acceptable used tire recovery initiative in Manitoba which would incorporate the plans of individual industry groups.
- Identify appropriate roles for non-industry stakeholders in achieving high waste diversion rates.
- Recommend a course of action for the Minister.

COMMITTEE

Membership on the Used Tire Committee was composed of:

Chair:	Dave Thompson	WRAP Branch, Manitoba Environment
Staff Support:	Debbie Kilfoyle	WRAP Branch, Manitoba Environment
Members:	David Morgan	The Rubber Association of Canada
	Brian James	The Rubber Association of Canada
	Rick Nelles	Canadian Tire
	Adrian Byles	Canadian Tire
	Bob Pierce	Canadian Tire
	Stuart Ballantyne	Bridgestone/Firestone Canada
	William Ratuski	Canadian Association of Recycling Industries
	Moe Tresoor	Western Canadian Tire Dealers and Retreaders Association
	Roger Ambrosie	Western Canadian Tire Dealers and Retreaders Association

REPORT OF THE WRAP COMMITTEE

ON USED TIRES

THE MANITOBA SITUATION

The present situation in Manitoba with reference to used tires, is that we generate annually approximately one million used tires. These are disposed of as follows:

Recycling	---	70,000/year
Retreading	---	60,000/year
Stockpiling	---	60,000/year
Landfilling	---	810,000/year

Most of the tires reused/recycled are generated in the Winnipeg area. It should be noted that the retreading process, although a good use of used tires, only delays the waste process. Clearly, the problem lies with the over 80% that end up in landfill sites.

Currently, we have approximately 40 sites of stockpiled tires, with none estimated to exceed 25,000 tires. Although of some concern, we are indeed fortunate that we did not have a potential "Hagersville" with its estimated 13 million tires.

Most of the used tires are generated in southern Manitoba, with the bulk in Winnipeg. Therefore, the collection/storage should not be too onerous. Ideally, outlying areas such as Thompson, The Pas etc., would act as a regional collection point, with "on site" processing facilities. Failing that, shipment by rail of whole tires, or shredded/chipped tires, to a central storage/processing site would be necessary. If the central user/processor was in Winnipeg (say possibly the cement plant) then the collection/storage process would be greatly facilitated. Collection from "fleet" accounts such as the Trucking/Taxi/Airline industries, along with the Province of Manitoba itself, the retail industry and auto wreckers would be carried out by licenced "tire jockeys". They would be responsible and accountable for the tires they collect and could be paid for out of a "Green Tax" with vehicle registration in Manitoba of approximately 750,000 tire using vehicles. An average $5.00 annual "Green Tax" would generate $3,750,000 which would go a long way to providing a fund to cover any costs associated with collection, and processing of the used tires.

TECHNOLOGY

It must be stated at the outset that there is no known technology which will allow the manufacturing industry to use significant quantities of used tire reclaim in the manufacture of safe new tires. Rubber reclamation involves degradation of the vulcanized rubber structure by mechanical, thermal or chemical processes. Reclaim retains some characteristics of a shorter chain polymer structure, but the reclamation process does not yield the equivalent of virgin raw materials due to retained cross linking, severed polymer chain length and inherent carbon black. Prior to the mid 1940's, tires were made from natural rubber, carbon black, curatives and other components spread uniformly through the tire. As a result, reclaimed rubber reflected this uniformity and was suitable for use in low performance applications or as an extender.

Approximately 5% of reclaim could be used in new tires without compromising the very limited performance standards of the time. Typical tire life was 5,000 to 10,000 miles. Manufacturing research has resulted in a series of performance advances achieved through the development of the steel belted radial and also through the use of synthetic elastomers. Elastomers and carbon blacks were specifically optimized for each section of the tire with different compounds for casing, sidewall and tread. This evolution has resulted in today's superior performance characteristics including a life cycle of 40,000 to 60,000 miles. It represents an excellent example of the first principle of waste management namely reduction in quantity. By achieving a long life cycle, potential scrap tire volumes have been proportionally reduced by a factor of 3 to 10, depending upon the base period chosen. Additionally, today's tires meet much more stringent safety and performance standards. Tire manufacturers continue to devote global research efforts to further enhance tire life for simple competitive reasons, but although continued success is being achieved, compromises could endanger the abilities of the product to have good traction, ride and therefore, overall safety.

This major tire evolution has had one negative impact, which is that a tire's complexity results in a reclaimed rubber which is a variable mixture of elastomers and carbon blacks and does not meet the high standards of specifically tailored virgin materials. In summary, reclaimed usage in tires does not represent a technically feasible option for recycling today's tires. With the less complex tire chemistry of the 1940's, only 5% to 10% of reclaim was generally used and with today's tires, similar or higher general usage could cause a counterproductive reduction in life cycle and even more important, endanger the safety factors involved in tires.

It should be noted that the overall waste minimization strategy for Manitoba basically assumes that the basis for measurement is 1988. Members of the Committee felt that this does not adequately recognize the substantial contribution of tire manufacturers who have successfully devoted enormous effort to lengthening the useful life of tires at a very substantial disadvantage to the industry.

We will now review the available known options listed in order of the four R's hierarchy:

1. REDUCTION

The tire manufacturing industry has very substantially reduced the number of scrap tires on the market by the phenomenal increase in tread life over the past 20 years. Essentially, tread life has trebled due to the introduction of the steel belted radial design and ongoing improvements in rubber compounding technology. Despite these very substantial product improvements, there has been a steady increase in vehicle registrations which, of course, adds to the problem. It has been estimated by Transport Canada that up to 75% of passenger tires on the road are under-inflated and that this factor leads to sub-optimal tire mileage. It has been estimated that up to an additional 30% tread wear might be obtained if motorists kept their pressures at the levels suggested by vehicle manufacturers. Publicity to encourage users to maintain proper pressures in their tires to ensure that the wheel alignment is properly in order, and that tires are rotated on a regular basis, could have a substantial impact on the numbers of tires which appear on the scrap heap. It should be noted that the tire companies have taken a very responsible attitude towards steady improvement in the tread life of their product and indeed although the major breakthrough of steel belted tires was made for competitive reasons, the fact is that tread life continues to be improved despite a steady move to more highly charged and maneuverable vehicles.

2. REUSE

The most obvious example of reuse is retreading. Most truck, airplane and off-the-road tires are routinely retreaded, some of these up to six or seven times. Relatively few passenger tires are retreaded. The reasons are several. Airplane tires are made for quite different purposes, having to withstand very brief periods of high heat build-up, so that they are made with a relatively thin tread compound which is routinely replaced under retreading. Truck tire casings are largely steel and well maintained by trucking fleets. Passenger casings are fabric and as mentioned earlier, passenger tires are routinely abused and under-inflated. The fact is that retreaders report anywhere from 75% to 90% of retread casings unsuitable for retreading following rigorous inspection.

Some used tires are resold, since there is sufficient rubber remaining for them to have ongoing use, particularly in areas like farm trailers etc. Others are used for crash barriers and in less common cases, reefs, boat bumpers etc. It will be seen, however, that there are limited uses in terms of making a serious dent in the numbers of scrap tires.

3. RECYCLING

As has been explained earlier, there is no known technology which allows tire manufacturers to make new safe tires out of old ones. Approximately 70% of virgin rubber goes into tires. A further 15% is used in other dynamic rubber products such as hose and belting. This leaves only 15% of traditional rubber products to find a home for 85% of the virgin rubber consumed by tires and other dynamic products. It is for this reason that we have the scrap tire disposal problem. Traditional markets for crumb, or reclaim rubber, generally include molded rubber products, friction break materials, rubber parts for automotive use and mats for various purposes including livestock. Athletic surfaces have also developed and there appear to be good prospects for the use of rubber in asphalt roads.

The use of crumb rubber as an additive in asphalt formulations for highway applications represents a potentially large market. It has been estimated that all scrap tires could be consumed in highway construction, if rubberized asphalt proves to be technically and economically acceptable for widespread application. However, market penetration of rubberized asphalt has been limited by the need to carefully evaluate technical and economic performance factors prior to its widespread use. Highway design engineers need to consider the impact of rubber in asphalt on many interrelated performance criteria including stability, durability, flexibility, fatigue resistance, skid resistance, as well as environmental factors.

The Province of Ontario laid down some 18 kilometres of experimental rubberized asphalt highway in the summer of 1990. One area of concern is that of recycling the highway. It appears that asphalt highway can normally be recycled when a road is remade, but it has been suggested that this may not be possible with rubberized asphalt.

A number of methods can be used for rubber introduction blending, curing and application. The four major types of rubberized asphalt currently being considered by different authorities are outlined here as described in the Scrap Tire Management in Ontario report of January 1991, prepared by Pilorusso Research Associates Inc.

The "Arizona System" - the original system involved pre-reaction of about 20 percent finely ground crumb rubber (20 to 50 mesh) with paving grade asphalt to create a rubber-modified binder which is then blended with aggregate to form the paving mixture. The process is patented by Karl Jacobson of International Surfacing and royalties are paid by contractors using the technology. The process requires specialized equipment to pre-react, pump and apply the rubberized asphalt mixture. A 1 to 1.5 percent increase in asphalt binder (from 6 percent in standard asphalt to about 7.2 percent in this system) is required to compensate for rubber absorption, and extender oils may be required to control viscosity. All of the above factors increase installed cost and vulnerability to improper installation. The system uses about 25 tonnes of crumb rubber (roughly 5,000 passenger tires) per kilometre of roadway 7.6 centimetres thick and 12 metres wide. Crumb rubber usage varies proportionately with actual thickness, length or width.

Plus-RideTM - The Plus-RideTM proprietary system is a distinctly different method of rubber addition, using crumb rubber as part of the aggregate rather than as an integral part of this binder. Approximately 3 percent coarse crumb rubber (0.3 to 0.6 centimeter in size) is blended with specially-graded mineral aggregate to form a dense-graded rubber/aggregate mixture. Normal asphalt binder is then added to form the rubberized asphalt pavement mixture. In addition to the cost of crumb rubber, installed costs are increased by requirements of specially-graded aggregate and 1 to 1.5 percent extra asphalt binder. However, specialized installation equipment is not required. This system has also proven vulnerable to improper application in inclement weather, and field mix adjustments are different from standard asphalt. Approximately 56 tonnes of crumb rubber or 11,000 passenger tire equivalents are required per kilometer (7.6 centimeters thick, 12 meters wide).

BAS "Takallou" System - A recently developed non-proprietary variation of the Plus-RideTM system is generally attributed to Dr. H. B. Takallou. It is very similar to Plus-RideTM, but uses two distinct crumb rubber particle size components (minus 10 mesh) to achieve a denser aggregate gradation. Although the crumb rubber component is more expensive due to inclusion of finer material, the final void volume is reduced and highway performance theoretically improves. Since royalty payments associated with Plus-RideTM are not required with this approach, total installed costs may be lower in spite of higher crumb rubber centimeter thickness, 12 meter width.

UltraFineTM - Another non-proprietary method has been proposed recently by Rouse Rubber Industries. It uses "UltraFine" (minus 80 mesh) crumb rubber as a reactive additive to the asphalt binder. Five to ten percent fine crumb rubber is blended with the asphalt binder, then mixed with aggregate in standard percentages to form the asphalt paving material. By using fine particles, high reaction times and temperatures required in the "Arizona" system are decreased. Therefore, standard highway construction equipment and asphalt binder percentages are used. UltraFineTM has a cost 1.6 to 2.0 times greater than coarser crumb rubber used in other methods. However, lower UltraFineTM percentages, standard equipment, and the absence of licencing fees theoretically allow this system to be installed at the lowest premium cost versus standard asphalt. The system uses about 10 tonnes of crumb rubber per kilometre (7.6 centimetres thick and 12 meters wide). Although the tire usage per kilometre is lower, the total installed cost premium per tire equivalent may be equal to, or lower than the other alternatives.

Of these systems, the first two were developed more than 15 years ago, and have been more widely applied. The latter two are relatively new techniques with experimental data just becoming available.

The performance results of rubberized asphalt using the "Arizona" and Plus-RideTM systems have been mixed. While some states (Arizona, California, and parts of Texas) have reported excellent long-term results, apparently justifying higher initial cost, others (Minnesota, Wisconsin, Massachusetts, and other) have experienced disappointing results. The pavement either showed inadequate performance improvement to justify higher cost, or in some cases, failed prior to control sections of standard asphalt. These performance differences have been attributed to inherent failure of the rubberized asphalt technology, improper application methods, or improper testing location choice (depending primarily upon the perspective of the evaluator). If rubberized asphalt was used throughout the Province, this application could absorb all the scrap tires generated. However, various proponents have been trying for many years to demonstrate the economic benefits of rubberized asphalt without notable success. The Pilorusso report concludes that unless economic benefits can be demonstrated, the additional cost of using rubberized asphalt will be about $2.00 per passenger tire equivalent on an ongoing basis.

The major barrier to increasing usage of crumb rubber in products other than asphalt for highways is the size of the market for such products. As pointed out earlier, over 80 percent of virgin rubber is absorbed by tires and other dynamic rubber products, so that given the present known markets, crumb rubber products will be capable of absorbing less than 10 percent of scrap tires generated.

4. RECOVERY

In view of the limited opportunities for reduction, reuse and recycling, it is necessary to take a look at the fourth R--Recovery.

Scrap tires have a high energy content of 30,000 to 33,000 kJ/kg which is roughly equivalent to hydrocarbon feed stocks from which they are manufactured. The energy can be recovered by combustion of whole or shredded tires as an alternative to traditional fossil fuels. Small quantities of whole tires have been burned as part of municipal solid waste introduced into mass burn units. Specially designed furnaces have been operated exclusively with whole tires generating electricity and/or steam. The first large unit capable of converting 400,000 tires per month into 14.5 MW of electricity began operation in Modesto, California in 1987 at a capital cost of $42 million (U.S.). The plant experienced initial difficulties in operation reliability and permit compliance, which reportedly are being corrected. Whole tires have also been utilized as a supplemental fuel in cement kilns in England, Germany and the United States displacing up to 20 percent of the energy otherwise applied by coal. Cement kilns have used either whole or shredded tires as a fuel. The choice between the two forms is generally based upon evaluation of site specific factors including:

1. Kiln type and configuration.
2. Metering system logistics and control requirements.
3. Metering system capital and operating costs.
4. Availability and cost of whole versus shredded tires.
5. Combustion controls.
6. Heat replacement objectives.

Cement kilns represent a large potential market for tire derived fuel because of their high energy consumption, operating conditions that are conducive to environmentally acceptable combustion and sensitivity to cost savings that may be achieved through alternative fuel usage. The quantity and method of tire derived fuel (TDF) introduction depends upon the specific kiln type. Dry preheater or precalcinor kilns typically used up to 20% (by heat displacement) TDF or whole tires introduced by a conveying system into the riser or preheater sections of the system. An additional 5 to 10 percent displacement may be achieved by blowing TDF into the product end of either wet or dry kilns.

The capital required for TDF usage in kilns is generally limited to fuel metering systems (constructed at a cost of $100,000 to $300,000) plus testing required to demonstrate environmental acceptability.

It is understood that the only cement kiln in Manitoba (Inland Cement) has shown interest in investigating alternative fuel sources including waste oil and tires. A preliminary estimate suggests that the kiln could use a maximum of 4,000 tires a day and that they currently operate 200 days each year. Inland suggested that a capital costs of $1 million may be necessary to refit the kiln. It was indicated that Inland might require a subsidy of 75 cents to $1.00 for each tire burned.

It is believed that wet kilns using 5 million kJ/tonne and 10 percent heat replacement could use the equivalent of about 2 million tires per 1,000 tonnes of clinker production. Based, however, on Inland Cement's current usage, it would seem that they might be able to use 80 percent of the used tires currently generated by the Province of Manitoba.

The second major historical application for tire derived fuel has been in stoker-fired power boilers within the pulp and paper industry. These boilers typically burn wood waste, generate steam and electricity for internal consumption. Fossil fuels like coal, oil or gas are often used to maintain boiler control and demand response. TDF can be introduced at 2 to 10 percent heat value displacement with the wood waste, to displace fossil fuel usage and enhance complete combustion of wet wood. The required quality of tire derived fuel is generally more stringent in this application than in cement kilns. Bead wire removal may be required to avoid grate fouling which results in increased maintenance expense and/or equipment outages.

TECHNICAL SUMMARY

It should be noted that this summary has excluded pyrolosis and petroleum slurry processing. The pyrolosis process generates oil, gas and other products through thermal decomposition of tires in an oxygen limited environment. This is not a new process, but it has not yet been proven to be technically and economically feasible. Perhaps the key problems are very high initial cost and limited markets for the ensuing products. Similarly, petroleum slurry processing is a technology to convert crumb rubber into naptha, a basic chemical building block. The process utilizes technology which has been commercially demonstrated with coal, but development steps are required to verify the feasibility of the process when rubber is included in the slurry. This is not yet a proven technology for commercial application.

In summary, applications for used tires come into three broad categories:

a) **New products from tire crumb**--This is environmentally the most desirable solution, but there are insufficient known markets to absorb anything more than a very small percentage of the crumb.

b) **Rubber asphalt in roads**--This is an area which is primarily in the hands of the Government of Manitoba. It holds considerable promise for the utilization of up to 100 percent of the scrap tires, but is yet to be fully proven technologically and economically.

c) **Tire Derived Fuel**--This is the solution being most widely adopted around the world at this time. If tire derived fuel is used to replace existing fossil fuels, it does not add to the global warming problem and it does serve to extend the fuel reserves of the nation. Trials and usage in other jurisdictions have demonstrated that emissions are equal to or lower than the emissions from current fuels. In addition to extending the limited fuel reserves, usage of tire derived fuel will help resolve the dilemma of how to make productive use of scrap tires.

REVIEW OF KEY FACTORS

1. A. The Problem

An estimated one million waste tires (assume passenger tire equivalents) are generated annually in Manitoba with approximately 75% being landfilled. Tires being landfilled create handling problems and a resource loss while those being stockpiled create a potential fire hazard and subsequent damage to the environment.

B. The Desired Solution

The desired solution is a system for the collection and proper disposal of waste tires in the Province of Manitoba which will be:

Effective - maximize collection rates.

Efficient - ensure proper waste tire management at the least cost to the consumer and government agencies.

Fair - functions in a manner which does not distort the market and ensures a level playing field for all concerned.

2. A. Collection

The collection of waste tires will involve numerous stakeholders, to name a few:

Retailers	Government
Trucking/Taxi/Airline Industry	Construction
Auto Wreckers	Manufacturers
Retreaders	

It must be noted from the above list that not all waste tires are generated by the retail consumer. Many "fleet" accounts exist within the industry who handle their own tire programs and are, therefore, generators of waste tires. This group may include the Trucking/Tax/Airline industries and the Province of Manitoba itself.

The collection system for the retail industry is essentially in place, in that when consumers purchase new tires at retail outlets, used tires are accepted by the retailer as a normal part of the transaction. Therefore, it is proposed that retailers must accept one waste tire of an equivalent size and type for each one purchased.

It is also assumed that the other stakeholders mentioned above currently "pile scrap at the back door" and dispose of same in a manner similar to retailers.

While do-it-yourselfers (over the counter consumers) and the farming community have not been considered, it must be assumed that the collection process could be considered to be in place for the bulk of waste tires generated in the Province.

B. Transportation

To ensure maximum and traceable collection of waste tires and transportation to a central staging area or out-of-province recycling facility, it is proposed that "tire jockeys" be licenced by the province. As it is part of their mandate to be licenced, accurate records of pickups must be kept. Targets should be set ideally at 100% with a minimum of 85% (current landfill 75% and 10% stockpile). Actual goals should be considered in the 90% to 95% range.

3. Accountability and Compliance

It is proposed that the accountability of the legislated program be based on records kept by the licenced "tire jockeys" and compared to the current projected volume estimated by the Province of Manitoba.

4. Financing System

Manufacturers and retailers of any product exist because of demand created by the public at large. It is therefore proposed that the cost of disposal be borne by the consumer. To create a level playing field, the price of "environmental responsibility" must be evident and not subject to the margins of any particular retailer or wholesaler.

A system whereby the consumer is hit with a "double whammy" at invoice time at the retail level must be avoided at all costs. By "double whammy", it is meant a provincially legislated tire tax and an individual tire jockey pickup fee. The Province of Ontario is an example when "Tire Tax of $5.00 + GST + PST = $5.75 is charged and the retailer is faced with an incremental charge from the tire jockey of $2.00 + GST + PST. The result is a potential charge for tire disposal that exceeds the advertised retail price of a tire by up to 25%. If the consumer is given a choice of taking his used/waste tires for an additional charge, we take the risk the consumer will take them and pitch them in the nearest ditch. The clean-up problem then becomes a municipal and/or provincial one in which the consumer ultimately pays. We also raise the risk of sending the consumer across provincial or international borders. The ultimate loser is the provincial and/or federal government in lost taxes.

Providing the tire disposal problem cannot be funded through current revenues, it is determined a so-called "Green Tax" must be applied. It is recommended that this tax be collected through the existing annual vehicle registration fee. In this manner, all users including the consumer will be treated equally. Auto wreckers who also contribute to the waste stream would also be assessed based on scrappage.

Any funds collected must be allocated to a special environmental accrual account (not into general funds) and distributed to totally offset any tire jockey or transportation costs to the consumer as well as provide incentives to private industry to develop products and markets for the materials generated from waste tires.

5. Strategy

Short term and long term solutions need to be put in place to deal with the waste tire problem. A great deal of effort is being made world-wide to develop markets and products for materials derived from waste tires. However, at this point in time, no large volume opportunities, except road paving, have been identified. It will require major market development of many yet to be developed new uses.

In the short term, TDF appears to be a viable alternative. This method of disposal being practised in many states in the U.S.A. and other countries around the world, is environmentally acceptable. Common industries using TDF include cement, pulp and paper and electrical generation. While this method of disposal may be lower on the "R" scale, it appears to be be a viable one especially in the short term and simply replaces current burning of scarce fossil fuels.

Long term solutions would include:

a) Developing markets and value added products incorporating crumb rubber for sale to the consumer.

b) Use of crumb rubber to produce rubber-modified asphalt for paving provincial roads. Depending on mixture type, application thickness, and yearly paving projects in the Province of Manitoba, the potential market for crumb rubber could be substantial.

It is to be noted that whatever product is produced, it must speak for itself in terms of quality, durability and value to the end user, be it the general public, industry or government.

The biggest hurdle we are faced with is that, unlike some other products entering the waste stream (i.e. automotive batteries), waste tires have no inherent value. In fact, the Pilorusso Report suggests a negative value of $2.00. It will therefore be necessary to provide funds in the form of grants or other means to encourage the private sectors to become involved with waste tire disposal.

Funding levels would have to be set to both encourage participation and at the same time, discourage the "grant seekers". It should be available for capital projects that process waste tires into raw materials for use in value added products, as well as projects to produce value added products. In addition, financial assistance should be made available for research and development of technologies necessary to produce the raw materials or value-added products.

Funding support for transportation of waste tires from the collection sites to central processing must be considered.

Underwriting of specific projects where disadvantage costs become a deciding factor (i.e. rubber-modified asphalt) must receive serious consideration for assistance.

The Provincial Government may wish to consider a favourable tax situation for products that contain a high percentage of recycled components--even on a temporary basis to encourage consumers to participate in the solution to the problem.

6. Roles for Non-Industry Stakeholders

In order to achieve high waste diversion rates, it is necessary that the consumer be made fully aware of the waste tire situation. He/she should be made aware of the following:

a) Scope of the problem in terms of quantity as it relates to the Province of Manitoba as well as to the global picture.

b) The four "R's" commonly referred to in environmental practice and how each of these applies to tires.

c) The action being taken to deal with the problem and the role of the consumer in the success of the program.

It is proposed that point of purchase brochures be made available by the retailer to educate the consumer on all of these points. The brochure produced by the Rubber Association of Canada may be useful.

7. Recommendations

To fulfill the objective of advising the Minister on "the best method to establish a comprehensive waste rubber storage, collection and reuse system in Manitoba to achieve a high rate of recovery of waste tires and other waste rubber products", the following recommendations are made by the Committee. It should be noted that these represent the collective views of the Committee, and do not reflect any input from Manitoba Environment. It should also be noted that owing to the short time frame within which the Committee operated, no attempt has yet been made to assign responsibilities or completion dates; the Committee anticipates that the implementation of these recommendations may well be the subject of further discussions with the Minister.

1) In order to get an accurate picture of existing inventories and to develop achievable targets for the collection of used tires throughout the Province, a consultant study would be useful. This could be undertaken along the lines of that which was produced by the Pilorusso report for the Province of Ontario.

2) Accept and promote tire derived fuel as a short term end use for used tires. Encourage and support the retrofit of the local cement kiln to take used tires as an energy source. Mount test burns as soon as possible to ensure that the tire derived fuel meets acceptable limits for air pollution.

3) Monitor the use of rubberized asphalt in other jurisdictions and institute test sections of road in Manitoba for local evaluation.

4) Determine funding requirements to implement and support the short term and long term strategies proposed above.

5) To raise the necessary funds, institute a tax through the existing vehicle registration fee. This offers the advantage of optimum collection efficiency without adversely affecting the competitiveness of the provincial industry.

6) Set up a fund to support the development of a crumb rubber industry on the basis of proposals made by private enterprise meeting acceptable provincial criteria.

7) Licence tire jockeys to pick up tires in the Province and transport them to approved sites--approved tire recycler premises. Require all retailers to accept scrap tires on a "one for one" basis (equal to sales) and send tires to approved destinations.